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Quasi-Option Value theory and the Expected Values of Future Information, illustrated by the Climate Change issue

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It is seldom put forward that :

(QUASI-)OPTION VALUE IS THE OPPORTUNITY COST OF NOT-LEARNING, OR GIVING UP FUTURE INFORMATION. (Hediger, 1994)

In this paper, we show the interest of framing the irreversibility effect in this context of values of information. The paper will be applied to and illustrated by the case of climate change.

1. We first remind that Quasi-Option Value (QOV) of a choice A against an irreversible alternative B is the Difference of Expected Values of Future Information (EVFI) between A and B. In this framework, the positiveness of the QOV becomes a very intuitive fact:

The EVFI is non negative for A, because value of information is non negative in general.

The EVFI is zero for B, because there will be no flexibility to use the information. For example, if CO2 emissions follows IS92a until 2020, then we will be unable to avoid a CO2 concentration of 450ppmv, even if climatologists warn us it is very risky.

Therefore, the sign of the difference QOV=EVFI(A)-EVFI(B) is known to be non negative.

2. Then, we review theoretical and practical advantages to use EVFI rather than QOV:

The words are less confusing. It allows to get rid of the too frequent confusion between risk premium (option value in Bishop, 1982), irreversibility effect (quasi-option value, in Fisher and Hanemann, 1985, but option value in Henry, 1974), and both (option values in general, Fisher and Hanemann, 1990). If we environmental economists want to deliver a clear message to policy makers, it is important to have a clear vocabulary. The value of information is an everyday concept materialized in books or internet costs. The fact that information can be a future good can also be understood clearly, subscribing to a newspaper is an example.

The QOV is clearly defined as long as a choice A is compared to a reference choice B. On the contrary, EVFI depends only of the choice being examined. It can be used to compare symmetrically any

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number of alternatives. Because QOV is defined by a difference, it may seems that the short-term costs of the various alternatives matter. That is misleading, as the irreversibility effect depends only on facts that will occur in the long term.

The QOV is paradoxical in the way that, as Faverau (1989) notes, "If the agent can compute it, then he doesn't need it. If he needs it, he can't compute it". On the contrary, EVFI can be seen as the correction to add to result of the certainty equivalent method to obtain the "right" result. There could be ways to approximate EVFI directly, for example by estimations and projections of the EV of _Present_ Information.

It becomes clear that if the information is dependant of choices, then a choice giving more information will lead to a higher EVFI.

3. Finally, we show that EVFI allows to frame the debate when, as is the case in climate change, there are many opposite irreversibilities. For example, should we worry more about the environmental one (accumulation of GHGs), or economic ones (that premature capital stock requirement will later be proven unnecessary) ?

Because the EVFI is not based upon irreversibility, but rather the interplay between flexibility and information, it becomes possible to weaken the "irreversibility effect" hypothesis and compare differences in flexibility. This lead to a qualitative discussion, where the irreversibility effect is only one case of a more general "learning effect".

As an application, we explore the conditions in which the (generalised) irreversibility effect would increase the interest of early mitigation of CO_2 emissions. Our analysis highligh several key factors we need to be better understood before an empirical judgment can be made. Socio economic inertia tend to decrease the EVFI if we do nothing to mitigate emissions. Long term adaptability of energy systems tend to increase EVFI if we take do precautionary abatement early. The possibility of surprises regarding the climate system implies that in a stochastic modelling framework, using only weakly non linear damage functions may be misleading.